

## Survey Study: Nurses' Awareness Regarding Percutaneous Injection Safety, (A Designed-Teaching Poster)

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### Abstract

**Aim of the Study:** To assess nurses' awareness regarding percutaneous injection safety and design a nursing-teaching poster.

**Subjects and Method:** Descriptive cross-sectional research design was utilized in this study.

**Sample and Setting:** 500 nurses that work in five ministries of health hospitals at Assiut city.

**Tools:** two tools used in the study, **tool (I):** Self-administered questionnaire sheet consisted of three parts: **part1;** demographic characteristics of the nurses, **part 2;** immunization and needle stick incidence among nurses and **part 3;** assessment of nursing awareness and knowledge about injection safety. **Tool (II):** Observational checklist sheet. In addition, a designed-teaching poster.

**Results:** Nearly all nurses 98.6% had a good awareness level and more than half had a satisfactory knowledge score and good practice score (69.4% and 63.4% respectively) regarding injection safety.

**Conclusion:** the studied nurse awareness level regarding percutaneous injection safety was adequate while their knowledge and practice scores were not in the same line.

**Recommendation:** Nurses in need for in-service training programs and refreshing courses to improve their knowledge about injection safety which will reflect on their practice.

**Keywords:** Survey Study, Percutaneous, Injection Safety, Nurses, Awareness, Teaching, and Poster

### 1. INTRODUCTION

Injection safety was defined as practices that intended to prevent transmission of infectious diseases between one patient and another, or between a patient and health care provider, and also to prevent harms such as needle-stick injuries (NSIs), and to ensure safe environment for health care providers, patients and community through appropriate management of dangerous medical waste (Abdul Aziz et al., 2013).

**Safe/Unsafe Injection:** An injection was considered safe if it did not harm the recipient, did not expose the provider to any avoidable risks and did not result in waste that is dangerous for the providers, recipients and community. On the contrary, an injection was therefore considered unsafe if it harmed the patients, exposed the provider to any avoidable risks and resulted in waste that was dangerous for the providers, recipients and community (Chowdhury et al., 2011).

Injection safety is not a high focus component of health care workers (HCWs) training

(physicians, nurses, paramedical workers...etc.) and most of the understanding on injections is by the simple rule of on the job training. Therefore, if a wrong practice is adopted by the person who is followed by HCWs, all of them learn the same mistakes and thus the effects are multiplied manifold in actual practice. Therefore, there is a need for a training module that can help address this most common intervention in health care (Njiru et al., 2013).

Unsafe injection practices are a major public health problem and can lead to the transmission of blood borne pathogens, including hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV). The prevalence of HBV and HCV in Egypt is high and unsafe injections transmit most of these infections. (Hanafi et al., 2011).

Nearly 22 million individuals are infected each year representing 33% of new HBV infections, 42% of new HCV infections and 2% of all new HIV infections that are attributable to unsafe injections. (Thrift et al., 2017)

The reasons and prevalence of unsafe injection practices differ all over the world, relying on huge number of factors; knowledge, awareness, socio culture, economics and legal factors. (Drechsel et al., 2015)

In general, unsafe injection practices include reusing injection syringes; administering unnecessary injections for those conditions for which oral medications are accessible and prescribed; accidental NSIs among health professionals while giving an injection; and improper handling and administration of the sharp wastes. (Tandon et al., 2017)

In hospitals, nurses are the first level of the staff in contact with the risk of infection from unsafe practices related to needles and sharps. They are expected to undertake activities related to patient care with the beginning of their clinical years, they lack experience and skill, therefore; at a higher risk of infection from unsafe practices related to needles and sharps (Wendland, 2012).

Percutaneous injection procedures performed by the healthcare personnel at the selected facilities were observed to determine the magnitude and types of unsafe injection practices (Al-Rawajfah, 2016).

Safe collection of percutaneous injection equipment requires the use of puncture-proof disposal containers. This limits the risk associated with recapping needles since they are disposed of immediately after use and encourages a safe working environment for healthcare providers. (Sam., 2016)

Nursing education, work experience, training on percutaneous injection safety (universal precautions) and regular supervision had to increase level of awareness among nurses. (Martin et al., 2013)

Getting staff to continuing education programs can be difficult due to time, staffing, and cost restraints. A self-instructional module combined with a teaching poster format has had a favorable response from participants. This format has the capability of reaching a higher number of participants and is both time- and cost-effective. (Jeffreys, 2018).

## 2. SIGNIFICANCE OF THE STUDY

Percutaneous injection is one of the key health care procedures used globally for administration of medicine; the practices of unsafe injection not only harm to patient but also carry out the risks to health care workers. From the researchers experience it has been observed that there is deficiency in nurses' knowledge regarding

percutaneous injection safety, which reflects negatively on their practice.

## The Aims of the Study

The aims of this study were to:

- Assess nurses' awareness regarding percutaneous injection safety.
- Design a nursing-teaching poster regarding percutaneous injection safety

## Research Questions

1. What is the awareness level of nurses about percutaneous injection safety?
2. What are the practical and knowledge levels of nursing regarding percutaneous injection safety?

## Operational Definition

**Awareness:** knowledge and understanding in all aspect of injection safety as evaluated by receiving right answer to all the questions related to awareness in that topic.

## 3. SAMPLE AND METHODS

**Research design:** A descriptive cross-sectional study was conducted in this study.

**Setting:** The study was conducted at Assiut ministry of health hospitals included: General Aleman Hospital, Assiut Fever Hospital, Chest hospital, General Assiut Hospital, Hospital of Ophthalmology.

**Sample:** All nurses working at Assiut ministry of health hospitals sample of (500), included: (120) nurses working at General Aleman hospital, (96) at Assiut Fever hospital, (100) at Chest hospital, (105) at General Assiut hospital and hospital of Ophthalmology about (79) nurses who were willing to participate in the study within seven months from the beginning of March to September at the year of 2018.

## 4. STUDY TOOLS

The following two tools were utilized to collect data in this study. They were developed by the researchers after extensive review of the relevant literature.

### Tool I: Self-Administrated Questionnaire Sheet

The aim of this tool was to assess nursing awareness and knowledge about percutaneous injection safety, this tool consisted of three parts:

**Part (1): Demographic Characteristic of the Nurses:** It included; hospital name, age, sex, marital status, qualification, years of experiences and training courses received regarding injection safety and infection control training.

**Part (2): Immunization and Needle Stick Incidence Among Nurses:** it Included 3 Items; (immunization against hepatitis B, needle stick injury in the last six months, recording of needle stick injury)

**Part (3): Assessment of Nursing Awareness and Knowledge about percutaneous injection safety:** The aim of this part was to assess nurses' awareness and knowledge about percutaneous injection safety.

**Regarding Awareness;** included (11) questions for awareness: hand washing preceding injection, use of gloves preceding injection, appropriate disposal after use and ----etc.

**Regarding Knowledge,** these parts included (6) questions: as (definition of Injection safety, definition of unsafe injection, diseases transmitted by NSI

### Scoring System

**Regarding Awareness;** scores assigned to each item were between 0 and 1 points as follows; (1=yes and 0=no).

According to range of total scores it was between (0-11 degrees),

Total nurses scores, were classified as:

- Positive awareness if their total score was  $\geq 7$ degrees ( $> 60\%$ ),
- Negative awareness if their total score was  $< 7$  degrees ( $<60\%$ ).

**Regarding Knowledge;** a 5-point Likert scale was used. Scores assigned to each item were between 0 and 3 points as follows; (poor, good, very good, and excellent).

According to the range of total scores it was between (0-18 degrees), Considering

- Satisfactory knowledge  $\geq 11$ degrees
- Unsatisfactory knowledge  $< 11$  degrees

Nurses were classified as having satisfactory level of knowledge if their total score was  $\geq 70\%$ , and were classified as having unsatisfactory level of knowledge if their total score was  $< 70\%$  degree. (Onianwa et al., 2017).

### Tool II: Observational Check-List Sheet

The aim of this tool was to assess nurses' practice about percutaneous injection safety.

It Included 18 items as (recapping of used needle with both hands, hand washing before and after administering injection etc...)

### Scoring System

That uses a 3-point Likert scale. Scores assigned to each item are between 0 and 2 points as follows; (not done, done incorrect, and done correct).

Not done = 0

Done incorrect = 1

Done correct = 2

According to range of total scores lie between (0-36 degrees), considering good practice as: 25 degrees of the total score, considering poor practice as:  $< 25$ degrees of the total score, nurses were classified as: good practice if their total score was  $>70\%$ , and were classified as poor practice if their total score was  $< 70\%$  (Walker et al., 2014).

### A Designed-Teaching Poster

- It was designed by the researchers based on the literature review, were used to improve nurses awareness regarding precautions injection safety, it consists of the precaution steps for preventing needle stick injury and improve nurses practice for injection safety as recapping of used needle with both hands, hand washing before and after administering injection.
- This poster contained colored pictures explaining each step clearly and seen easily.
- The teaching poster was put in the nursing unite in an observed obvious accessible side.

### Subject and Methods

- An official letter was issued from the Dean of the Faculty of Nursing to the Head of internal medicine department soliciting the necessary approval to conduct the present research after explaining the aim and nature of the study to them to obtain their cooperation.
- A review of national and international related literature in the various aspects of the problem using books, articles, periodicals, and magazines was done.

**Content Validity of Tools:** was established by 5 expertise's (3 specialist in medical- surgical nursing and 2 experts in medical field) who reviewed the tools of data collection for clarity, relevance, comprehensiveness, understanding, and applicability. Modifications were made accordingly, and then the tools were designed in their final format and tested.

**Content Reliability:** was estimated by Cronbach test. The tools proved to be reliable at (0.73, 0.71 and 0.81 respectively).

**A Pilot Study** was carried out in April ,2018 that was conducted on 10% of the sample in the selected setting, it consisted of (50) nurses who were added to the study later as there were no modifications. The purposes of the pilot study were to detect any particular problem in the statements clarity, feasibility, and applicability of the tools.

**Ethical Consideration**

- The study will follow the common ethical guidelines of clinical research according to the principles of **Helsinki Declaration** for medical research, (1996).
- Research proposal was approved by ethical committee of the faculty of nursing.
- Informed consent was taken from nurses participating study, after explaining the nature and purpose of the study.
- Confidentiality and anonymity were being assured.
- Nurses were assured that, the data of his research will not be refused without second permission.
- Nurses were informed that they refuse to participate and or withdraw from the study without any rational any time.

**Data Collection:**

- The data collection from nurses (nearly one month) for each hospital and the researcher collected data at the time of medication administration at morning and afternoon shifts every day except Friday.
- Data were collected through the period from 1/4/2018 to 30/9/2018
- At initial interview; the researcher introduced herself to initiate communication and explained the nature and purpose of the study.

- Nurses were asked to fill out the questionnaire sheet (**tool I**) to assess nurses` awareness and knowledge completely and truthfully. Nurses spent (10-15) minutes to complete it.
- Each nurse was observed directly by the researcher while performing routine injection to fill the observational checklist sheet (**tool II**).
- At this time, all available nurses were observed and the researcher spent 20-30 minutes to complete the observation check list while the nurses were performing the routine injection procedure.
- The questionnaire and observation checklist sheets were entered into computer for data analysis by utilizing SPSS program.
- Based on the nurses' assessment, the researchers designed a teaching poster after reviewing the literature review. It aimed to improve nurses' knowledge and practice regarding precautious injection safety.
- The designed poster premeditated in a colored pictures with simple short guidelines statements. The researchers put it in a suitable obvious site

**Statistical Design**

The statistical Package for (SPSS) version (23) was used to analyze data. Descriptive statistics was used for the quantitative data in knowledge and awareness questionnaire and the demographic data. Descriptive statistics included: Frequencies, percentages and cross tabulation. The level of significance for this study was set at (p = 0.05) to detect any indication of differences found in the data available.

**5. RESULTS**

**Part I. Description of the Studied Nurses Characteristics**

**Table1.** Distribution of demographic characteristics of the studied nurses (n=500)

Items	N.	%
<b>Age (years)</b>		
20-30	310	62
30-40	131	26.2
40-65	59	11.8
<b>Sex</b>		
Male	60	12
Female	440	88
<b>Marital Status</b>		
Single	109	21.8
Married	380	76
Divorced	5	1
Wooden	6	1.2
<b>Educational Level</b>		
Diploma	200	40

Technical	215	43
Baccalaureate	85	17
<b>Work Experience (In Years)</b>		
<5	205	41
5-10	128	25.6
>10	167	33.4
<b>Injection Safety Training in Last Two Year</b>		
Yes	382	76.4
No	118	23.6
<b>Infection control training</b>		
Yes	464	92.8
No	36	7.2
<b>Total</b>	<b>500</b>	<b>100</b>

**Table2.** Percentage distribution of immunization& needle stick incidence for the studied nurses (n=500)

Variables	No	%
<b>Immunization against hepatitis B</b>		
Yes	434	86.8
No	66	13.2
<b>Needle sticks injury in last 6 months</b>		
Yes	109	21.8
No	391	78.2
<b>Recording for those who have needle stick injury (n=109)</b>		
Yes	32	29.5
No	77	70.5

## Part II. Nurses 'Awareness Regarding Percutaneous Injection Safety

**Table3.** Distribution of the studied nurses 'awareness level regarding injection safety (n=500)

Awareness about	Positive awareness		Negative awareness	
	N.	%	N.	%
1-Avoid recapping of needles after use.	<b>441</b>	<b>88.2</b>	59	11.8
2-Hand washing proceeding injection.	485	<b>97</b>	15	3
3-Use of gloves proceeding injection.	465	<b>93</b>	35	7
4-Appropriate disposal after use.	484	<b>96.8</b>	16	3.2
5- Avoid bending of needles after use.	475	<b>95</b>	25	5
6- Avoid reuse of used syringes or needle.	490	<b>98</b>	10	2
7-Appropriate use of safety boxes.	478	<b>95.6</b>	22	4.4
8-Use of dry cotton for cleaning area.	295	<b>59</b>	205	41
9- Adequacy of safety box supply.	420	<b>84</b>	80	16
10 -Regularity of safety box supply.	409	<b>81.8</b>	91	18.2
11- Collection of needle in safety box.	448	<b>89.6</b>	52	10.4
<b>Total</b>	500			100

## Part III. Nurses' Knowledge Regarding Percutaneous Injection Safety

**Table4.** Percentage distribution of the studied nurses 'knowledge regarding injection safety. (n=500)

Knowledge	Poor		Good		Very good		excellent	
	N.	%	N.	%	N.	%	N.	%
Definition of Injection safety.	<b>269</b>	<b>53.8</b>	85	17	125	25	21	4.2
Definition of unsafe injection.	<b>304</b>	<b>60.8</b>	87	17.4	87	17.4	22	4.4
Diseases transmitted by NSI.	163	32.6	<b>202</b>	<b>40.4</b>	121	24.2	14	2.8
Possible causes of NSI.	197	39.4	<b>205</b>	<b>41</b>	94	18.8	4	.8
Preventive measures from NSI.	165	33	<b>178</b>	<b>35.6</b>	141	28.2	16	3.2
Measures to be taken after NSI.	<b>188</b>	<b>37.6</b>	142	28.4	137	27.4	<b>33</b>	<b>6.6</b>



**Table5.** Distribution of total nurses practice score regarding percutaneous injection safety practice. (n=500)

Checklist items	Done correct		Done incorrect		Not done	
	N.	%	N.	%	N.	%
	1-Wash hands before injection.	66	13.2	163	32.6	271
2-Wash hands after injection.	118	23.6	264	52.8	118	23.6
3-Wear gloves before injection.	308	61.6	13	2.6	179	35.8
4-Read the label over medication vial or ampoule.	339	67.8	125	25	36	7.2
5- Injections are prepared using aseptic technique.	430	86	56	11.2	14	2.8
6-The rubber septum on a medication vial is a disinfected with alcohol prior to piercing.	40	8	25	5	435	87
7-Aspirating drug from ampoule.	51	10.2	11	2.2	438	87.6
8-Needles and syringes are used for only one patient.	476	95.2	5	1	19	3.8
9-Two hands recapping.	275	55	19	3.8	206	41.2
10-Disinfection of area done by alcohol swab by using inward to outward direction.	120	24	138	27.6	242	48.4
11-Medication vials are entered with a new needle.	475	95	2	.4	23	4.6
12-Multi-dose vials to be used for more than one patient.	229	45.8	5	1	266	53.2
13-Multi-dose vials are dated by HCP when they are first opened and discarded within the time period.	217	43.4	4	0.8	279	55.8
14-Presence of dirty sharps exposed nurses to NSI.	53	10.6	8	1.6	439	87.8
15-Immediate discarding of sharps in a sharp box.	476	95.2	13	2.6	11	2.2
16-Appropriate disposal / destruction of sharp S.	485	97	10	2	5	1
17-Bending of needles after use.	5	1	3	0.6	492	98.4
18-Used needle outside safety box.	13	2.6	3	0.6	484	96.8

**Table6.** Comparison Between Nurses at the Selected Hospitals Regarding their Awareness, Knowledge and Practice regarding percutaneous Injection Safety (n=500)

Hospital Name	Awareness Level				p.value	Knowledge score				p.value	Practice score				p.value
	Good		Poor			Satisfactory		Unsatisfactory			Good		Poor		
	N.	%	N.	%		N.	%	N.	%		N.	%	N.	%	
General Aleman Hospital (n=120)	116	23.2	4	0.8	1.88NS	66	55	54	45	0.001**	91	75.8	29	24.2	0.001**
Assiut Fever Hospital (n=96)	96	19.2	0	0.00		46	47.9	50	52.1		49	51.0	47	49.0	
Chest hospital(n=100)	98	19.6	2	0.4		67	67	33	33		69	69	31	31.0	
General Assiut Hospital (n=105)	104	20.8	1	0.2		76	72.4	29	27.6		59	56.2	46	43.8	
Hospital of Ophthalmology (n=79)	79	15.8	0	0.00		62	78.5	17	21.5		79	100	0	0.0	
Total(n=500)	493	98.6	7	1.4		317	63.4	183	36.6		347	69.4	153	30.6	

**Table (1) showed that:** The majority of nurses were female, their age ranged from 20-30 years, married, technician, and their experience from a year to 5years (88.0%, 62%, 76.0%, 43.0%, and 41.0% respectively), regarding their training the majority had training about safety injection, and

infection control (76.4% and 92.8%) respectively.

**Table (2) shows that,** (86.8%) of nurses received hepatitis B vaccination, (78.2%) didn't have NSIs in the last six months, and (70.2%) did not record that they had a NSIs.

**Table (3) mentioned that;** Nearly all nurses were aware about using syringe and needle for only one patient, hand washing before injection, discarding the used syringe and needle in a safety container and avoiding recapping of needles after giving injection (98%, 97%, 96.8% and 88.2% respectively). It was found that nurses were aware about appropriate using of safety boxes and not bending needles after use (95.6% and 95% respectively).

**Table (4) illustrated that,** more than half of nurses had poor knowledge about definition of unsafe injection and definition of injection safety (60.8% and 53.8%). In addition, nurses had good knowledge about possible causes of NSI and diseases transmitted by NSI (41% and 40.4%). In addition, (37.6%) of studied nurses had poor knowledge about measures to be taken after NSI but (35.6%) of them had good knowledge level on preventive measures from NSI.

**Table (5) mentioned that;** The majority of nurses were (97%) appropriately dispose sharps and discard it immediately in safety box, (95.2%), used needles and syringes for only one patient, and (61.6%) of them wear gloves before injection and (55%) used two hands for recapping. In the other hand majority of nurses didn't bend the needles after use, didn't use needle outside safety box, presence of dirty sharps exposed nurses to NSI, aspirating drug from ampoule, (98.4%, 96.8%, 87.8%, and 87.6%,).

**Table (6) shows that,** there were no significance statistical differences between the nurses at five hospitals regarding awareness level and there were statistical significant differences between them regarding (knowledge and practice) scores.

## 6. DISCUSSION

Based on the results of the present study, the majority of the nurses their age was from 20 to 30 years, married, females, had diploma of nursing, and the majority of them had infection control training. This study result was in the same line with the study of **Moussa and Shahin, (2015)** entitled as "Evaluation of an educational program on nurses' knowledge and practice regarding standard precautions of infection control measures in outpatients clinics". According to work experience, more than one third of the nurses were having less than 5 years of service experience. This study result disagreed with **Onyemocho et al., (2013)** in their study entitled as "knowledge and practices of injection safety among workers of Nigerian Prison

services health facilities in Kaduna State" when they said that; large proportion of nurses had 6 years of experience.

Concerning training on injection safety, more than two thirds had prior training. This result was in the same line with **Khurram et al., (2011)** in their study entitled as "Needle stick injuries: a survey of doctors working at tertiary care hospitals of Rawalpindi" who reported that; most of the injection providers had been sent for training on safe injection practice. Regarding vaccination against hepatitis B, more than two thirds of nurse had received vaccination against hepatitis B. This study was in the same line with **Gurung et al., (2010)** who stated that; more than two thirds of the nurses received vaccination against Hepatitis B.

It was alarming that; more than two thirds of nurses were still not reporting NSI to the hospital administration. This finding was consistent with a study in hospitals of Polkhara and Nepal done by **Kaphle et al., (2014)** who revealed that; majority of nurses did not reporting NSI to the hospital administration also **Foda et al., (2017)** who conducted a study entitled as " Safe injection procedures, injection practices, and needle stick injuries among health care workers in operating rooms in Alexandria University, Egypt" told that; majority of nurses did not report their exposure of NSI. On the other hands, these findings are in opposition to the results of a study were done by **El Tawil, (2016)** in Al jouf region, Saudi Arabia, who reported that; more than two thirds of nurses had reported NSI and took post-exposure medication.

Regarding awareness level, the current study showed that nearly all nurses were aware that needle should be discarded after use, this finding is similar with the study conducted in hospital of Kolkata, and West Bengal, India by **Paul et al., (2011)** who stated that; majority of nurses correctly mentioned needle should be discarded after use. The data illustrate that majority of nurses were aware about hand washing proceeding injection practice as in **Shrestha et al., (2018)** in a study entitled as " Knowledge and Practice on Infection Prevention among Nurses of Bir Hospital, Kathmandu" who found that; more than two thirds of nurses were aware about the importance of hand washing procedure.

Regarding sharps disposal after use, most of nurses were aware about appropriate disposal after use, this finding was contradicted with the study entitled as "Assessment of Knowledge and

Practices on Injection Safety among Service providers in east Godavari District of Andhra Pradesh' carried out by **Garapati and Peethala., (2014)** who stated that; only quarter of the sample were having knowledge about correct disposal of sharps.

The current study showed that; more than two thirds of nurses were aware of avoiding recapping needle after giving injection. Similar result was presented in a study from Surat by **Naik et al., (2012)** where half of the study sample were aware of avoiding recapping needles. Correspondingly, the study was done by **Hauri et al., (2008)** also suggested that; avoiding needle recapping and other hand manipulation are essential to prevent NSIs.

Regarding nurses knowledge about definition of safe and unsafe injection; more than half of nurses didn't know the right meaning of safe and un safe injection. In contrast a study was done by **Zhang, et al., (2018)** and reported that; most participants knew the correct definition of them. Regarding disease transmitted through unsafe injections; more than one third of nurses gave right answer about if HIV/AIDS, Hepatitis B, & C could be transmitted through unsafe injections, similar finding in the study conducted by **Omorogbe et al., (2012)** entitled as " Injection safety practices among nursing staff of mission hospitals in Benin City, Nigeria".

Likewise, this study results were supported by a study conducted in a tertiary care hospital of Pakistan by Siddique et al., (2008) who stated that; third of the sample reported that the most common cause of NSI was recapping of needle. The data revealed that; more than one third of the nurses knew the preventive approaches of NSI which is comparatively lower with the study conducted among nurses in East Go jam Zone Health Institutions, Ethiopia which was conducted by Aderaw, (2013) who said that; only few nurses knew the preventive measures after getting NSI where in a study conducted in Khanevedeh Hospital in Tehran by Galougahi, (2013) that reported nurses knew it. Also a study conducted in health centers in El-Minia Governorate in Egypt by Hossein, (2015) who told that; there is a risk of acquiring blood-borne infections through a lack of adequate knowledge among these nurses about the consequences of NSIs.

On observation during the study the researcher found that, more than half of nurses didn't practice regular hand washing with water and soap before and after administering injection. In contrast to a study was done by **Öncü, et al.,**

**(2018)** who showed that; more than two thirds of nurses were practicing regular hand washing with water and soap and **Paul et al., (2011)** said that; only less than quarter of nurses were practicing hand washing with soap and water. The finding of this study was in agreement with the study conducted by **Levine, (2018)** where more than two thirds of nurses didn't wash their hands before and after administering injection. This study was found that; most of nurses had a good knowledge about hand washing, but during observation it was found that; only less than quarter of nurses washed their hands before and more than quarter of them washed their hands after injecting correctly. This result was in the same line with a study conducted by **Lori, et al., (2016)** who said that; more than half of the sample didn't wash their hands before and after giving injection.

Regarding rubber septum of multi-dose vial cleaning with alcohol before withdrawing drug from vials, in this study more than two third of nurses didn't perform this step in injections. In contrast a study entitled as" An observational Study of Safe Injection Practices in a Tertiary Care Teaching Hospital" was done by **Mehta et al., (2016)** who reported that; more than one third of the nurses did this step in injections procedure.

This study showed that; more than half of nurses used to practice two handed recapping of needle and more than half still recap needles all the time after use. This finding was contradictory with a study conducted by Onyemochi et al., (2013) where more than two thirds of participants didn't recap needle after use. Fernandes et al., (2017) reported that; only more than one third of participant recap needle. A similar situation was also observed in a studies were done by Oladimeji et al., (2012), and El Tawil,(2016) in Al jouf region, Saudi Arabia showed that; most of respondents practice were recapping of needle after use. This practice of recapping and detaching of needles increase the risk of NSIs among the nurses.

The current study reported that, nearly all nurses' did not bended needles after giving injection and collecting syringe and needles in safety box. This study was in accordance with a study conducted by **Kaphle et al., (2014)** entitled as "Awareness and Practices on Injection Safety among Nurses Working in Hospitals of Pokhara, Nepal " who stated that; no nurses were involved in such practice, as they always disposable syringe and needles in safety box.



The data illustrated that, there were no significance statistical differences between them regarding awareness level and there were statistical significant differences between the five hospitals regarding (knowledge and practice) scores. Also the majority of nurses had a good level of awareness regarding injection safety but in their practical level were not in the same level, this was supported by **Blanton et al., (2018)** who mentioned that; knowledge and practice of health care providers were nearly up to mark.

Finally, Unsafe handling practices of needles prior to disposal (e.g. two-hand recapping) were more frequent among all health-care workers where two-hand recapping of needles was the commonest cause of such injuries and there was no significant difference between those who had received training and those who had not. Nurses who were exposed to NSIs reported that; they did not do anything at all after exposure. Only a small proportion reported that they took a vaccination against HBV infection as soon as possible after the injury. Furthermore, after NSIs, health-care workers who were injured did not deal properly with their injuries.

## 7. CONCLUSION

Based on the results of the present study, it can be concluded that:

1. Majority of the nurses had a good level of awareness regarding injection safety but less than half had unsatisfactory knowledge and the practical injection safety precautions were not followed properly.
2. This study showed that most healthcare workers (HCWs) followed the proper injection protocols but performed some mistakes that exposed them and the community to the risk of NSIs and blood borne infections example; washing hands, wearing/changing gloves, repeated handling of sharps like needle and wiping of needle with swab and breaking of ampoule with solid object.

## RECOMMENDATIONS

Based on the findings of the present study, the following recommendations are derived:

1. Further training and awareness program, refreshing courses and periodic workshops on injection safety to all nurses to increase their knowledge which will reflect competence on their practice.
2. It should be mandatory for all employees in every hospital to get immune-prophylaxis

against Hepatitis B before entering into clinical setting.

3. Reporting of NSI is mandatory to higher officials of infection control committee; regular screening of nurses and laboratory technicians for infections transmitted through contaminated needles should be done on regular intervals

## FOR FURTHER RESEARCH

1. Regular nursing educational program about injection safety to prevent mistakes that expose nurses and the community to the risk of NSIs and blood borne infections.
2. Replication of the study on a large probability sample acquired from different geographical areas in Egypt to figure out the main aspects of this problem.

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